

when executed by the processor, compute a normalized average ground reaction variable by dividing the impulse variable by the stance time variable.

31/30. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim ²⁸25, wherein the force analysis instruction set comprises instructions which, when executed by the processor, compute a first normalized average ground reaction force variable by dividing the impulse variable for a first applied force by the first stance time variable and compute a second normalized average ground reaction force variable by dividing the impulse variable for a second applied force by the second stance time variable.

31. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim 29, wherein the force analysis instruction set comprises instructions which, when executed by the processor, compute a speed of the animal using a signal output by the speed sensing device.

32. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim 30, wherein the force analysis instruction set comprises instructions which, when executed by the processor, compute a speed of the animal using a signal output by the speed sensing device.

26/33. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim ²⁵31, wherein the force analysis instruction set comprises instructions which, when executed by the processor, compute a step size of the animal by calculating a

difference between a first position at which a limb applies a force to one of the first and second plates and a second position at which the same limb applies a force to the respective first or second plate along an axis of motion of the animal.

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34. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim ³²~~32~~, wherein the force analysis instruction set comprises instructions which, when executed by the processor, compute the product of the impulse variable and the animal speed to obtain a characteristic unit length.

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al 35. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim ²⁶~~33~~, wherein the force analysis instruction set comprises instructions which, when executed by the processor, compute the product of the first impulse variable and the animal speed to obtain a first characteristic unit length and to compute the product of the second impulse variable and the animal speed to obtain a second characteristic unit length.

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36. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim ¹²~~18~~, wherein the force analysis instruction set comprises instructions which, when executed by the processor, compute the m-energy applied to the first plate or second plate by a limb of the animal by integrating a magnitude of the applied force to the first plate or second plate with respect to a frequency in a frequency domain.

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37. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with

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claim 18, wherein the force analysis instruction set comprises instructions which,
when executed by the processor,

compute a first m-energy applied to one of the first and second plate by a fore limb of the animal by integrating a magnitude of the applied force to the plate with respect to a frequency in a frequency domain, and

compute a second m-energy applied to one of the first and second plate by a hind limb of the animal by integrating a magnitude of the applied force to the plate with respect to a frequency in a frequency domain.

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38. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim 12, wherein the force analysis instruction set comprises instructions which, when executed by the processor, compute the p-energy by taking the product of a magnitude of a force applied to the first plate or second plate by a limb of the animal and frequency integrated over a frequency domain.

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39. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim 12, wherein the force analysis instruction set comprises instructions which, when executed by the processor,

compute a first p-energy by taking the product of a magnitude of a force applied to the first plate or second plate by a fore limb of the animal and frequency integrated over a frequency domain; and

compute a second p-energy by taking the product of a magnitude of a force applied to the first plate or second plate by a hind limb of the animal and frequency integrated over a frequency domain.

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40. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim 11, wherein the force analysis instruction set comprises instructions which, when executed by the processor, compute a symmetry factor indicative of a difference in a force applied to the first plate and a force applied to the second plate.

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41. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim 11, wherein the force analysis instruction set comprises instructions which, when executed by the processor, compute a symmetry factor indicative of a difference in a force applied to one of the first plate and the second plate by a fore limb and a force applied to one of the first plate and the second plate by a hind limb.

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42. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim 34, wherein the force analysis instruction set comprises instructions which, when executed by the processor, compute the symmetry factor by taking the dividend of a right limb movement variable minus a left limb movement variable on the numerator and a right limb movement variable plus a left limb movement variable on the denominator.

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43. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim 41, wherein the force analysis instruction set comprises instructions which, when executed by the processor, compute the symmetry factor by taking the dividend of a fore limb movement variable minus a hind limb movement variable on the numerator and a fore limb movement variable plus a hind limb movement variable on the denominator.

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44. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim 42, wherein the right limb movement variable and the left limb movement variable comprise a normalized peak ground reaction force.

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45. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim 43, wherein the fore limb movement variable and the hind limb movement variable comprise a normalized peak ground reaction force.

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46. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim 42, wherein the right limb movement variable and the left limb movement variable each comprise an impulse variable.

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47. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with

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claim ~~43~~, wherein the fore limb movement variable and the hind limb movement variable each comprise an impulse variable.

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~~48~~. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim ³⁵~~42~~, wherein the right limb movement variable and the left limb movement variable each comprise a stance variable.

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~~49~~. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim ⁴⁴~~43~~, wherein the fore limb movement variable and the hind limb movement variable each comprise a stance variable.

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~~50~~. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim ³⁵~~42~~, wherein the right limb movement variable and the left limb movement variable each comprise a normalized average ground reaction force variable.

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~~51~~. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim ⁴⁴~~43~~, wherein the fore limb movement variable and the hind limb movement variable each comprise a normalized average ground reaction force variable.

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~~52~~. A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with

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claim ~~42~~, wherein the right limb movement variable and the left limb movement variable each comprise a step size variable.

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⁵³ A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim ⁴⁴~~43~~, wherein the fore limb movement variable and the hind limb movement variable each comprise a step size variable.

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⁵⁴ A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim ³⁵~~42~~, wherein the right limb movement variable and the left limb movement variable each comprise an m-energy variable.

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⁵⁵ A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim ⁴⁴~~43~~, wherein the fore limb movement variable and the hind limb movement variable each comprise an m-energy variable.

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⁵⁶ A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with claim ³⁵~~42~~, wherein the right limb movement variable and the left limb movement variable each comprise a p-energy variable.

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⁵⁷ A computer-based diagnostic system to detect and analyze ground reaction forces produced by an animal passing through the diagnostic system in accord with